

6367254 MOTOROLA SC (XSTRS/R F)

96D 80565 DT-33-19

**MOTOROLA**  
**SEMICONDUCTOR**  
**TECHNICAL DATA**

**BD186**  
**BD188**  
**BD190**

**PLASTIC MEDIUM POWER  
SILICON PNP TRANSISTOR**

... designed for use in 5 to 10 Watt audio amplifiers utilizing complementary or quasi complementary circuits.

- DC Current— $h_{FE} = 40$  (Min) @  $I_C = 0.5$  Adc
- BD 186, 188, 190 are complementary with BD 185, 187, 189

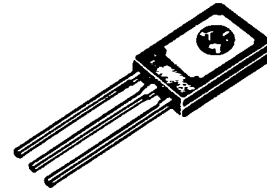
**4 AMPERE  
POWER TRANSISTOR**

**PNP SILICON**

**30, 45, 60 VOLTS  
40 WATTS**

**MAXIMUM RANGS**

Rating	Symbol	Type	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	BD 186 BD 188 BD 190	30 45 60	Vdc
Collector-Base Voltage	$V_{CBO}$	BD 186 BD 188 BD 190	40 55 70	Vdc
Emitter-Base Voltage	$V_{EBO}$		5	Vdc
Collector Current	$I_C$		4.0	Adc
Base Current	$I_B$		2.0	Adc
Total Device Dissipation $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$		40 320	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$		-65 to +150	$^\circ\text{C}$



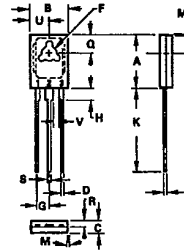
**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	3.12	$^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$  unless otherwise noted)**

Characteristic	Symbol	Type	Min	Max	Unit
Collector-Emitter Sustaining Voltage* ( $I_C = 0.1$ Adc, $I_B = 0$ )	$BV_{CEO}$	BD 186 BD 188 BD 190	30 45 60	—	Vdc
Collector Cutoff Current ( $V_{CB} = 40$ Vdc, $I_E = 0$ ) ( $V_{CB} = 55$ Vdc, $I_E = 0$ ) ( $V_{CB} = 70$ Vdc, $I_E = 0$ )	$I_{CBO}$	BD 186 BD 188 BD 190	— — —	0.1 0.1 0.1	mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0$ Vdc, $I_C = 0$ )	$I_{EBO}$		—	1.0	mAdc
DC current Gain ( $I_C = 0.5$ A, $V_{CE} = 2$ V) ( $I_C = 2$ A, $V_{CE} = 2$ V)	$h_{FE}$		40 15	—	
Collector-Emitter Saturation Voltage* ( $I_C = 2.0$ Adc, $I_B = 0.2$ Adc)	$V_{CE(sat)}$		—	1.0	Vdc
Base-Emitter On Voltage* ( $I_C = 2.0$ Adc, $V_{CE} = 2.0$ Vdc)	$V_{BE(on)}$		—	1.5	Vdc
Current-Gain-Bandwidth Product ( $I_C = 1.0$ Adc, $V_{CE} = 10$ Vdc, $f = 1.0$ MHz)	$f_T$		2.0	—	MHz

\* Pulse Test: Pulse Width  $\leq 300$   $\mu\text{s}$ . Duty Cycle  $\leq 2.0\%$ .



MILLIMETERS		INCHES	
DIM	MIN - MAX	MIN - MAX	
A	5.00 11.00	0.20 0.43	0.25
B	2.98 3.74	0.29 0.25	0.25
C	2.42 2.86	0.09 0.11	0.10
D	0.11 0.88	0.00 0.04	0.04
E	2.92 3.17	0.11 0.12	0.11
F	2.32 2.88	0.09 0.11	0.09
G	1.27 2.41	0.05 0.09	0.05
H	2.92 3.17	0.11 0.12	0.11
I	11.81 11.92	0.47 0.47	0.47
J	2.79	0.11	0.11
K	3.18 4.81	0.12 0.19	0.15
L	1.18 1.28	0.05 0.05	0.05
M	0.44 0.48	0.02 0.02	0.02
N	2.98 3.92	0.12 0.16	0.14
V	1.02	—	0.04

STYLE 1  
1. PNP - EMITTER  
2. COLLECTOR  
3. BASE

NOTES:  
1. M1 - MAIN TERMINAL  
2. LEADS MUST BE POSITIONED WITHIN 2 DEGREE BE CH  
3. LEADS TO DIMS A & B AT MAXIMUM MATERIAL  
CONDITION.

**CASE 77-05  
TO-126**

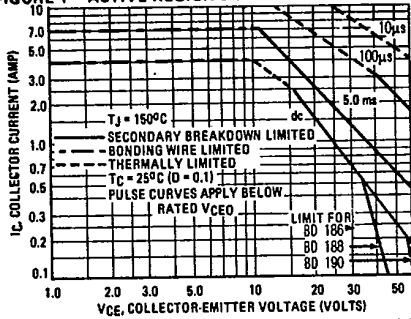
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96D 80566 D

BD186, BD188, BD190

T-33-19

FIGURE 1 - ACTIVE-REGION SAFE OPERATING AREA



The Safe Operating Area Curves indicate  $I_C$ - $V_{CE}$  limits below which the device will not enter secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a catastrophic failure. To insure operation below the maximum  $T_J$ , power-temperature derating must be observed for both steady state and pulse power conditions.

FIGURE 2 - COLLECTOR SATURATION REGION

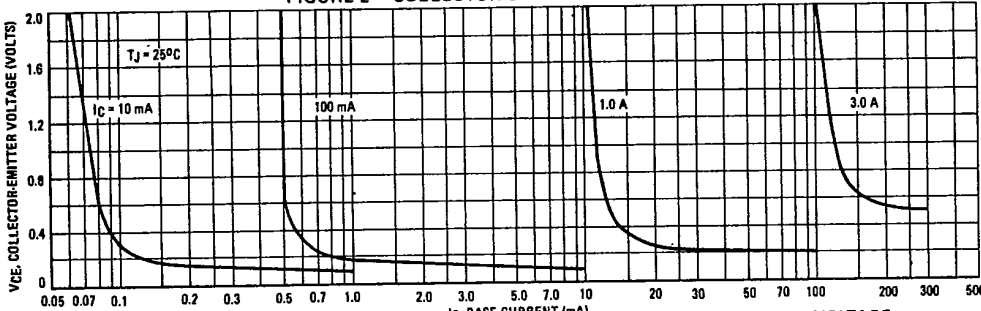


FIGURE 3 - NORMALIZED DC CURRENT GAIN

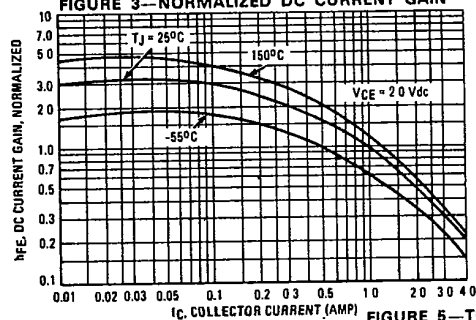


FIGURE 4 - "ON" VOLTAGE

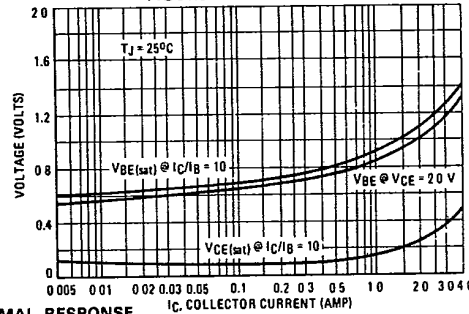
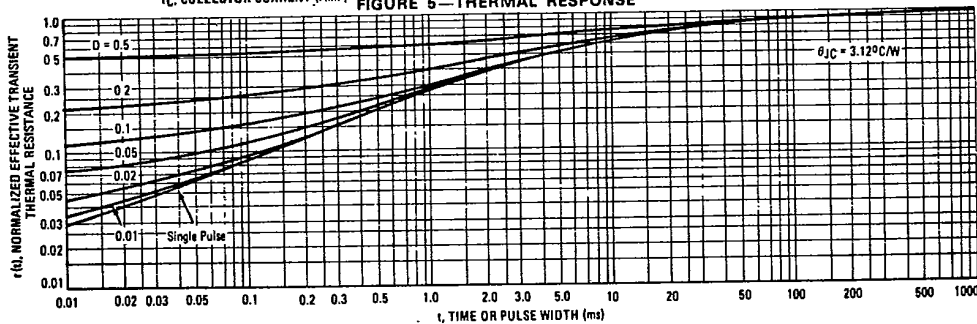


FIGURE 5 - THERMAL RESPONSE





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